

TABLE OF CONTENTS

1.2	Historical Background	5
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LIST OF FIGURES

Figure 1.2.1	Evolution of the South Florida Water Management Model	7
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1.2 HISTORICAL BACKGROUND

“There are no other Everglades in the world. They are, they have always been, one of the unique regions of the earth; remote, never wholly known.” -- Marjory Stoneman Douglas

There are no other numerical models of the Everglades that can account for the suite of hydrologic processes and water management options that are unique to South Florida. The South Florida Water Management Model (SFWMM) is the primary tool used to evaluate the interaction of water supply and demand with hydrologic conditions in Palm Beach, Broward and Miami-Dade Counties and portions of seven other counties in South Florida. Initial work on the model started in the 1970s. The model was completed by the South Florida Water Management District (SFWMD or District) under contract (DACP17-81-C-0035) for the U.S. Army Corps of Engineers (USACE or Corps). Technical Publication 84-3 (TP84-3) "South Florida Water Management Model Documentation Report" was released in February 1984.

Driven by the need to evaluate additional complex water management options and longer periods of record, the SFWMM has evolved through several major revisions. In the early 1980s, the model ran a 14-year period of record from 1965 to 1984. By the late 1980s, the model was used to evaluate potential impacts of several major projects. In the early 1990s, the model was simulating a 19-year period of record with expanded capabilities. At that time, there was a special interest in simulating the natural system, specifically the remnant Everglades. By removing the water conveyance infrastructure and operational policies from the SFWMM, a new model was created that made simulation of the “natural conditions” possible. The new model was called the Natural System Model (NSM) and was completed in 1991. NSM is used to infer how the system might have behaved before anthropomorphic changes to the environment (SFWMD, 1998). Because the NSM uses the same hydrometeorological record as the SFWMM, comparison between “natural conditions” and managed systems can be made more reliably.

Throughout the early to mid-1990s, the SFWMM continued to expand in capability and application. However, not all improvements were made solely to the model code; some improvements were made to develop a SFWMM modeling system. Geographical Information System (GIS) products provided additional spatially-oriented features and the development of visualization tools enhanced the ability to review output. In 1997, a draft of “Documentation for the South Florida Water Management Model” was produced and a peer review was initiated and completed a year later.

In 1997, the SFWMM v3.5 modeling system was ready for the most ambitious application up to that time – the development and evaluation of the Central & Southern Florida (C&SF) Restudy. The C&SF Restudy was a holistic review of the C&SF region with the focus of improvement on restoration of the natural areas while respecting the other water-related needs of the region. By that time, the period of record spanned 31 years starting in 1965. All major operational rules for the system were simulated within the model. Not only were over 900 performance indicators and measures being produced, but they were available on the web for the public to evaluate and provide comments. The SFWMM was used to make sensitivity runs to better define operational and design guidelines for numerous components. Multi-agency teams developed the input criteria and evaluated modeling results. The model output and post-processed information

allowed non-technical stake-holders, hydrologists, engineers, biologists, and ecologists to converse in common language. A restoration plan was developed and subsequently approved, in concept, by Congress in December of 2000.

Today, there are approximately 1,800 miles of canals and levees, 25 major pumping stations and about 200 larger and 2,000 smaller water control structures. The model has been dramatically improved and continues to play a crucial role in the evaluation of water resource management in South Florida. This document provides pertinent information about the science and capabilities of the model as they exist in the SFWMM, version 5.5. Figure 1.2.1 provides an evolution of the development and application of the SFWMM to date.

This documentation describes general model characteristics, hydrologic processes, management options, and simulation methods. The SFWMM is a useful tool to evaluate regional water budgets for establishing water reservations and to evaluate alternatives for managing the water resources of the C&SF region. It provides valuable information, such as boundary conditions, that can be used in local or smaller-scale hydrologic/hydraulic models in South Florida.

The most unique feature of the SFWMM is the ability to simulate operational scenarios, management options, and define regional water budgets. There are other surface/groundwater models that could be applied to the hydrology of the Everglades (especially at a sub-regional scale), but there are no other models that have the suite of management options and operational flexibility of the SFWMM for large-scale, system-wide interactions. Examples of the flexibility and operational features of the model will be discussed primarily in Chapter 3.

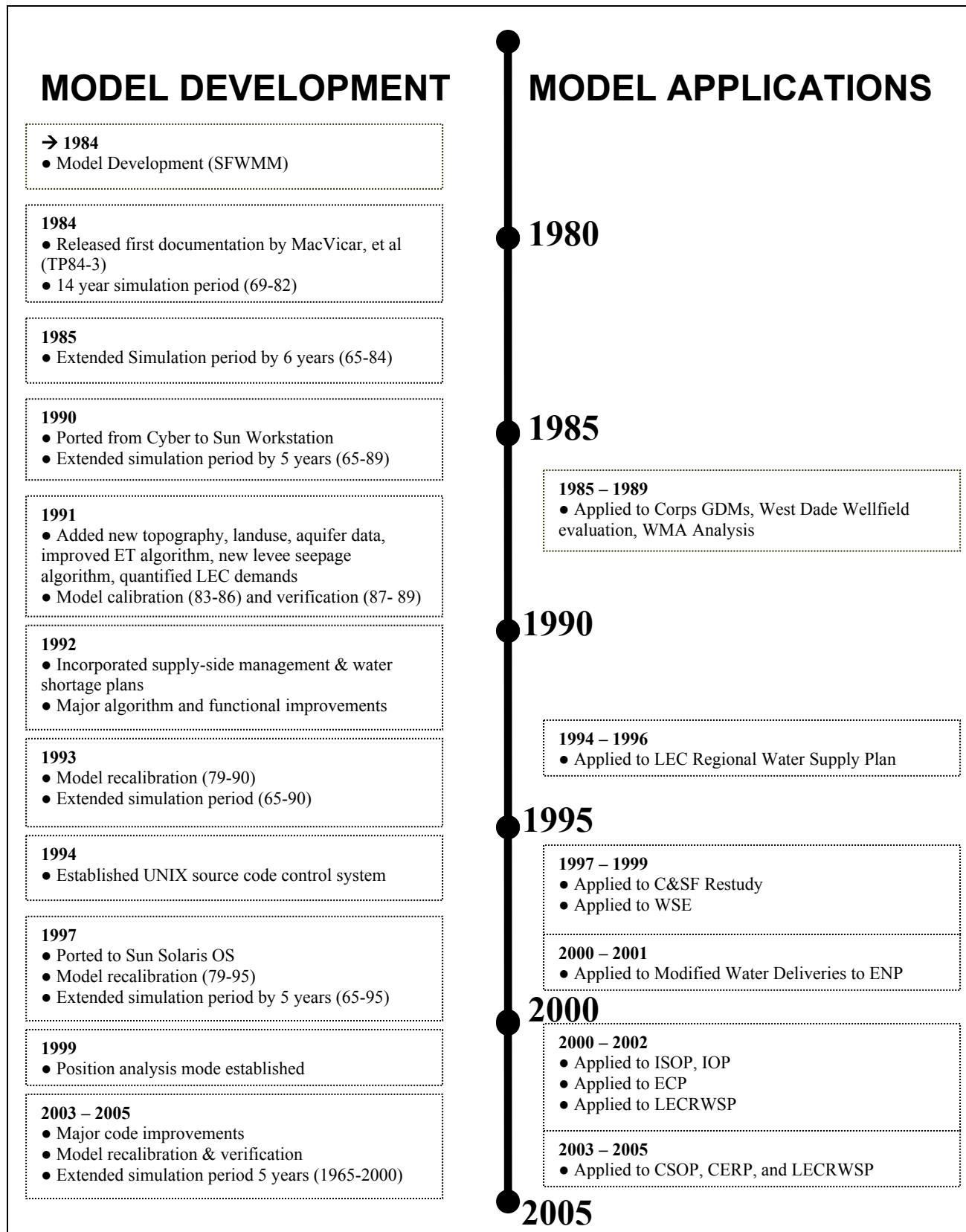


Figure 1.2.1 Evolution of the South Florida Water Management Model

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